REMARKS

The Amendments

The claims are amended so that the method claims are now written as electrochemical cell claims which have a porous solid prepared by the method as an electrolyte. Claims to an electrolyte with porous solid prepared by the method and a catalyst with porous solid prepared by the method. This is not new subject matter since it was encompassed by previous claims 11, 20 and 21, for example. The claims are further amended to make clear that the porous solid prepared by the method is mechanically stable, as supported by the disclosure at page 2, lines 33-36, for example.

To the extent that the amendments avoid the prior art or for other reasons related to patentability, competitors are warned that the amendments are not intended to and do not limit the scope of equivalents which may be asserted on subject matter outside the literal scope of any patented claims but not anticipated or rendered obvious by the prior art or otherwise unpatentable to applicants. Applicants reserve the right to file one or more continuing and/or divisional applications directed to any subject matter disclosed in the application which has been canceled by any of the above amendments.

The Rejection under 35 U.S.C. §103

The rejection of claims 1-11 and 17-25 under 35 U.S.C. § 103, as being obvious over Leonard (U.S. Patent No. 3,681,136) in view of Oehme (Liquid Electrolyte Sensors article) is respectfully traversed. Applicants maintain their previous arguments in traversal of this rejection but provide the following additional comments in light of the new claims.

Leonard discloses a method for forming what they call a porous metal salt coating on a metal substrate surface for use as an electrode. Leonard discloses that the electrode must provide a short ionic migration path through the metal salt to the metal layer; see, e.g., col. 1, lines 37-45. Thus, the layer has to be very thin, i.e., about 100 microns and 500 microns maximum; see, e.g., col. 5, lines 28-50, and col. 7, line 74, to col. 8, line 9.

Leonard fails to disclose or suggest an "electrochemical cell, which contains, as electrolyte, a mechanically stable porous solid comprising one or more inorganic ionic components, the pores of which are filled with a liquid electrolyte." Leonard fails to disclose or suggest:

- that the porous layer is a mechanically stable porous solid,
- filling of the pores with a liquid electrolyte,
- the combination of a mechanically stable porous solid with pores filled by a liquid electrolyte as an electrolyte, or
- an electrochemical cell containing such combination as an electrolyte or as a sensor for detecting gases, or a catalyst containing such a combination,

The very thin porous metal salt layer of Leonard is not a mechanically stable porous solid. It would be evident to one of ordinary skill in the art that, without the metal substrate it is provided on, such a thin porous layer is not mechanically viable or stable. Further, it would not have been obvious from Leonard to provide a porous metal salt of sufficient thickness or size that it would be mechanically stable. Leonard specifically requires a very thin layer. There would be no motivation to modify Leonard to provide a thicker layer of the porous metal salt because such would be contrary to the Leonard teachings requiring a thin

layer with short migration path. In the absence of the requisite motivation to modify Leonard, a mechanically stable porous solid is not obvious therefrom under 35 U.S.C. §103.

It was recognized in the Final Office Action (bottom of page 2) that Leonard fails to teach filling of the pores of its metal salt layer with a liquid electrolyte. The Oehme reference was cited for a suggestion to contact an electrode with a liquid electrolyte and the Office Action indicates that it was presumed that such contact would result in filling of the pores when the Leonard electrode is used in that manner. Assuming for argument that this suggestion and presumption are valid, the combined teachings are still deficient for the above stated distinction regarding mechanical stability and, additionally, for the following two reasons.

There is no suggestion from the combined teachings of Leonard and Oehme that, even if the pores of the thin metal salt layer of Leonard were filled with a liquid electrolyte, that such-filled porous layer would provide an electrolyte, as a whole. Leonard discloses its layer only in conjunction with a metal substrate for use together as an electrode. The distinction in objectives and structure of the Leonard electrodes from the porous solid electrolyte of the claimed invention further directs one of ordinary skill away from the claimed invention. Leonard is directed to a materials for making electrodes, and the porous salt of Leonard is merely the outer layer part of the electrode. An electrode has different properties and objectives than an electrolyte. Applicants' invention provides porous solids having a high conductivity, for example, for use as a solid electrolyte; see, e.g., the paragraph bridging pages 5-6, and Example 3, page 7, of the instant specification. A solid electrolyte with mechanical stability – such that it requires no supporting structure according to applicants' invention – clearly provides advantages and uses which could not be met by the thin layer porous metal salt of Leonard, whether or not the pores are filled with a liquid electrolyte.

Nothing in Leonard or Oehme suggests to one of ordinary skill in the art that the thin metal salt layer of Leonard could be removed from the substrate, filled with an electrolyte and used, on its own, as an electrolyte.

Finally, Leonard fails to disclose or suggest an electrochemical cell having the structure as defined in claim 1 as an electrolyte or as a sensor for determination of gases, or a catalyst containing the mechanically stable porous solid structure as defined in claim 28. As pointed out above, Leonard suggests only an electrode application wherein the thin porous metal salt layer is only a part of the structure. It does not disclose or suggest any of the structures recited by applicants' claims.

For all of the above reasons, at least, it is urged that the combined teachings of Leonard and Oehme fail to render the claimed invention obvious to one of ordinary skill in the art. Thus, the rejection under 35 U.S.C. § 103 based on these references should be withdrawn.

The Rejection under 35 U.S.C. §102/103

The rejection of claims 10, 11 and 18-23 under 35 U.S.C. § 102, as being anticipated by, or under 35 U.S.C. § 103, as being obvious over, Shen (U.S. Patent No. 5,650,054) is respectfully traversed.

In response to the arguments in the Advisory Action, applicants respectfully point out that, although the claims have product-by-process aspects, they do recite structural aspects that distinguish the Shen disclosure. Further, process recitations in a product-by-process claim can result in structural limitations where the structure is necessitated by the process. The above amendments to the claims are believed to make this even more clear. The instant claims clearly recite – as a structural recitation separate from the process recitations – that the

porous solid comprises one or more inorganic ionic components and that the pores of the porous solid are filled with a liquid electrolyte. Neither of these structural recitations are met or suggested by Shen.

The argument is made in the Advisory Action that it is not relevant to the instant claims whether the porous material is hydrated by water vapor or liquid water, as long as the end result of hydration is met. But the claims do not recite that the porous material is "hydrated." The claims recite that the "pores .. are filled with a liquid electrolyte." It is urged that, while contact with water vapor may hydrate a material, it does not result in providing liquid water so that the pores would be filled with the liquid. As applicants pointed out previously, in order to be practically useful as an electrolyte, the pores must be filled with the liquid electrolyte to provide optimal conductivity. Mere hydration would not achieve such optimal state.

Regardless, the membrane of Shen is not taught or suggested to be "porous" as that term is used in the instant claims. The nature of the solid proton conductive electrolyte membrane in Shen is discussed at col. 8, lines 21-55, for example. Claim 1 recites that this solid proton conductive electrolyte membrane is "permeable to water **vapor**" (emphasis added). Shen refers to this membrane as being solid and shows it (see element 12 in figures 6 and 7) as a solid homogeneous element even in the microscopic view of these figures.

The context of applicants' specification and the claims makes clear to one of ordinary skill in the art that the term "porous" in applicants' claims refer to porosity to a liquid in order that the pores can be filled with a liquid electrolyte. The permeability to water vapor property in the Shen membrane provides no suggestion that the membrane is porous to a liquid electrolyte. Porosity to water vapor does not imply porosity to liquid water (see, e.g., Gore-Tex and similar type materials discussed by Shen itself at col. 8, lines 55-63). Further,

Shen makes it quite clear that porosity to a liquid is not desired. One of the principal objectives of Shen is to avoid the use of porous materials filled with a liquid. See the Background discussion at col. 2, line 6, to col. 4, line 16, particularly noting the problems resulting from liquid electrolytes and the desire to provide a sensor with all solid conductor components. Accordingly, the Shen reference itself establishes the absence of any desirability – and thus any motivation – to provide a porous membrane that is or could be filled with a liquid electrolyte. Such would be directly contrary to the objectives of the Shen invention and thus not obvious to one of ordinary skill in the art.

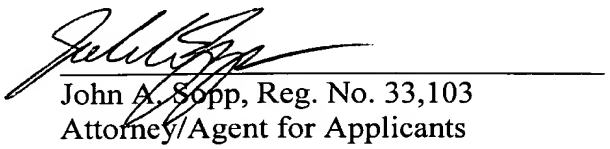
The "microporous hydrophobic membrane 204" of Shen is a completely separate material from the electrolyte membrane of Shen. The microporous hydrophobic membrane is made of a polymer material and, thus, does not "comprise inorganic ionic components." Thus, the "microporous hydrophobic membrane" of Shen also does not anticipate or render obvious the claimed invention for at least this reason.

For all of the above reasons, at least, it is urged that Shen fails to teach or suggest the claimed invention to one of ordinary skill in the art. Thus, the rejection under either 35 U.S.C. §102 or 35 U.S.C. §103 over Shen should be withdrawn.

It is submitted that the claims are in condition for allowance. However, the Examiner is kindly invited to contact the undersigned to discuss any unresolved matters.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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